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Tongbi Jiang

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EXAMINER

IM, JUNGHWA M

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 09/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary****Application No.**

09/942,245

**Applicant(s)**

JIANG, TONGBI

**Examiner**

Junghwa M. Im

**Art Unit**

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16, 19-24, 26-41 and 44-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 19-24, 26-41 and 44-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-8, 10-12, 14-16, 20, 21, 23, 24, 26-28, 30-33, 35-37, 39-41 and 45-49 are rejected under 35 U.S.C. 102(b) as being anticipated by Yamada et al. (US 5,864,178), hereinafter Yamada.

Regarding claims 1-3, 6-8, 10-12, 14-16, 20, 21, 23, 24, 26-28, 31-33, 35-37, 39-41 and 45-49, Fig. 58 of Yamada shows a semiconductor assembly comprising:

a semiconductor device (or a die; 201) having an active surface having a plurality of bond pads (224);

a substrate (202; a wiring circuit board) having an upper surface having a plurality of circuits;

a plurality of bumps (203) connecting said plurality of bond pads on said active surface of said semiconductor device to said plurality of circuits on said upper surface of said substrate;

said plurality of bumps forming a gap between said semiconductor device and said substrate;

an underfill material (encapsulation resin; col. 56, lines 20-26) to fill the gap between said substrate and said semiconductor device (or between the substrate and the wetting agent layer);

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a wetting agent layer of about a monolayer thick, said wetting agent layer wettable by a polymeric material (207, 208) provided on the active surface of said semiconductor device and on a upper surface of substrate (col. 56, lines 22-63 and col. 17, lines 53-59); and

said wetting agent including silane (col. 56, lines 29-63).

Regarding claims 5 and 30, Yamada discloses the wetting agent layer reduces surface tension of the active surface throughout the specification especially in col. 20, lines 34-65.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4, 9, 13, 19, 22, 29, 34, 38 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamada in view of Wong et al. (US 6,180,696), hereinafter Wong.

Regarding claims 4, 9, 13, 19, 22, 29, 34, 38 and 44, Yamada shows substantially the entire claimed structure except a specified wetting material. Wong discloses ethyltrimethoxysilane as a wetting material for an underfill process applied for a flip chip packaging. It would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the teachings of Wong for the wetting layer of Yamada in order to have to good adhesion between chips and substrates, therefore reducing a surface tension in-between as taught in a portion of col. 15, lines 18-22 of Wong's reference.

***Response to Arguments***

Applicant's arguments filed June 14, 2004 have been fully considered but they are not persuasive.

1. Applicant argues that "The silane coupling agent [of Yamada] is only used in the formation of the encapsulation resin itself, not separately applied to either the semiconductor chip or the wiring circuit." Examiner disagrees. First, it is pointed that the instant claim recites "a wetting agent layer ... wettable by a polymeric material" and the wettable agent layer is formed of silane which is resin. With this understanding, starting in column 56, line 22, Yamada explicitly discloses that a polymer film (207, 208) is formed on the semiconductor chip and on the wiring circuit board. And this polymer film has wettability to the resin (col. 17, lines 53-58).

2. Regarding the argument on 35 U.S.C. 103 rejection based on Estes in view of Wang, it is pointed that the rejection should have been written as being unpatentable over Yamada in view of Wong. However, all the detailed further statement clearly recited Yamada. Therefore, it should be understood that the rejection is based on Yamada in view of Wang.

3. Applicant further argues that "The Wong reference does not teach or suggest the use of a silane coupling agent as part of the epoxy base polymeric composition." However, Wong discloses ethyltrimethoxysilane (silane based material) as a wetting material for an underfill process applied for a flip chip packaging (col. 15, lines 18-22).

4. In response to Applicant's argument that there is no suggestion to combine the references of Yamada and Wong, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 189 USPQ

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607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 595 (CCPA) 1969.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi



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